

CLAIMS

We claim:

- 1 1. A mining system for extracting mineral deposits in a mineral reserve accessible from a
2 sloping surface, comprising:
3 means for mining the sloping surface to create a highwall, thereby forming a bench;
4 means for forming an insertion highwall in a portion of the highwall generally
5 perpendicular to a desired direction of mining the mineral reserve, thereby
6 forming endwalls on opposing ends of the insertion highwall;
7 means for creating a starter entry into the mineral reserve across the entire length of
8 the insertion highwall between the endwalls; and
9 means for supporting a roof in the starter entry and for backfilling a portion of the
10 starter entry with spoil to form a starter passage between the endwalls.
- 1 2. The system of claim 1 further comprising:
2 means for successively mining the mineral reserve moving from one endwall to the
3 other in a direction of production to extract mineral deposits therefrom thereby
4 forming at least one successive passage advancing in the direction of mining; and
5 means for providing roof support for successive passages resulting from the
6 extraction of mineral deposits from the mineral reserve.
- 1 3. The system of claim 2, further comprising means for reversing the direction of
2 production between the endwalls for successive passages.
- 1 4. The system of claim 2, wherein the means for providing roof support for successive
2 passages comprises advancing roof supports inserted into the starter entry, whereby the
3 roof collapses behind the roof supports to form the next successive passage.

- 1 5. The system of claim 2, further comprising:
2 means for extending the bench and highwall a first predetermined distance from the
3 insertion highwall to form a first mining stage for mining a first predetermined
4 number of successive passages; and
5 means for mining the mineral reserves using the first mining stage to extract mineral
6 deposits from the first predetermined number of successive passages through the
7 mineral reserve.
- 1 6. The system of claim 5, further comprising:
2 means for extending the bench and highwall a second predetermined distance from
3 the first predetermined distance to form a second mining stage for mining a
4 second predetermined number of successive passages; and
5 means for backfilling the first mining stage to recontour the surface with spoil
6 resulting from mining the sloping surface of the second mining stage.
- 1 7. The system of claim 1, wherein the means for mining the sloping surface comprises a
2 shortwall miner.
- 1 8. The system of claim 2, wherein the means for successively mining the mineral reserve
2 comprises shortwall mining.
- 1 9. The system of claim 2, wherein the means for successively mining the mineral reserve
2 comprises longwall mining.
- 1 10. The system of claim 1, further comprising means for ventilating the starter passage at
2 one of the endwalls.

1 11. A mining system for extracting mineral deposits in a mineral reserve accessible from a
2 sloping surface, comprising:
3 means for mining the sloping surface to create a highwall, thereby forming a bench;
4 means for forming an insertion highwall in a portion of the highwall generally
5 perpendicular to a desired direction of mining the mineral reserve, thereby
6 forming endwalls on opposing ends of the insertion highwall;
7 means for successively mining the mineral reserve moving from one endwall to the
8 other in a direction of production to extract mineral deposits therefrom thereby
9 forming at least one successive passage advancing in the direction of mining; and
10 means for providing roof support for successive passages resulting from the
11 extraction of mineral deposits from the mineral reserve.

1 12. The system of claim 11, wherein the means for successively mining the mineral reserve
2 comprises longwall mining.

1 13. The system of claim 11, wherein the means for successively mining the mineral reserve
2 comprises shortwall mining.

1 14. The system of claim 11, further comprising means for reversing the direction of
2 production between the endwalls for successive passages.

1 15. The system of claim 11, wherein the means for providing roof support for successive
2 passages comprises advancing roof supports as mining continues in the direction of
3 mining, whereby the roof collapses behind the roof supports to form the next successive
4 passage.

1 16. The system of claim 11, further comprising means for backfilling portions of the bench
2 and highwall adjacent successive passages with spoil resulting from mining the sloping
3 surface.

1 17. The system of claim 11, further comprising means for ventilating at least one of the
2 successive passages at one of the endwalls of the successive passage.

1 18. The system of claim 11, further comprising means for positioning one canopy at one
2 endwall and another canopy at the other endwall to provide safe access to each
3 successive passage.

- 1 19. A method for extracting mineral deposits in a mineral reserve comprising:
2 contour mining to expose at least a portion of the mineral reserve, thereby forming a
3 highwall and a bench;
4 creating an insertion highwall in a portion of the highwall between a pair of
5 endwalls; and
6 extracting mineral deposits by mining from one endwall to another in a direction of
7 production and advancing into the mineral reserve in a direction of mining
8 substantially perpendicular to the insertion highwall.
- 1 20. The method of claim 19, wherein the step of advancing into the mineral reserve is
2 accomplished by repeating the step of extracting mineral deposits by mining from one
3 endwall to another.
- 1 21. The method of claim 20, wherein the direction of production for extracting mineral
2 deposits during each subsequent pass from one endwall to the other endwall is reversed.
- 1 22. The method of claim 21, wherein the reversible direction of production is substantially
2 parallel to the insertion highwall.
- 1 23. The method of claim 20, further comprising ventilating each successive passage formed
2 by moving between the endwalls.
- 1 24. The method of claim 19, wherein the highwall is substantially straight between the
2 endwalls.
- 1 25. The method of claim 19, wherein the step of extracting mineral deposits is accomplished
2 using shortwall mining techniques.
- 1 26. The method of claim 19, wherein the step of extracting mineral deposits is accomplished
2 using longwall mining techniques.
- 1 27. The method of claim 19, further comprising providing roof support for mining
2 equipment as minerals are extracted between the endwalls.

1 28. The method of claim 27, further comprising advancing roof support as mining continues
2 in the direction of mining, whereby the roof collapses behind the roof supports.

1 29. A method for extracting mineral deposits in a mineral reserve accessible from a sloping
2 surface, comprising:
3 mining the sloping surface to create a highwall, thereby forming a bench;
4 forming an insertion highwall in a portion of the highwall generally perpendicular to
5 a desired direction of mining the mineral reserve, thereby forming endwalls on
6 opposing ends of the insertion highwall;
7 cutting a starter entry into the mineral reserve across the entire length of the insertion
8 highwall between the endwalls; and
9 inserting roof supports into the starter entry and backfilling a portion of the starter
10 entry with spoil to form a starter passage between the endwalls.

1 30. The method of claim 29, further comprising:
2 successively mining the mineral reserve moving from one endwall to the other in a
3 direction of production to extract mineral deposits therefrom thereby forming at
4 least one successive passage advancing in the direction of mining; and
5 providing roof support for successive passages resulting from the extraction of
6 mineral deposits from the mineral reserve.

1 31. The method of claim 29, further comprising ventilating the starter passage at one of the
2 endwalls.

1 32. The method of claim 29, further comprising:
2 positioning one canopy at one end of the starter passage adjacent an endwall; and
3 positioning another canopy at the other end of the starter passage adjacent the other
4 endwall.

1 33. The method of claim 32, further comprising coupling a reversible ventilation fan to at
2 least one of the canopies to ventilate the starter passage.

1 34. The method of claim 29, wherein the step of mining the sloping surface is accomplished
2 by contour mining.

- 1 35. The method of claim 29, wherein the bench is adapted to support mining equipment.
- 1 36. The method of claim 29, further comprising:
2 creating at least one power substation disposed on the bench to provide power to
3 mining equipment.
- 1 37. The method of claim 29, wherein the roof supports are inserted via a shield carrier.
- 1 38. The method of claim 29, further comprising:
2 forming a safety bench above the insertion highwall and parallel to the bench.
- 1 39. The method of claim 30, further comprising:
2 conveying the mineral deposits from the mineral reserve to a stockpile.
- 1 40. The method of claim 29, wherein the backfilling occurs along the roof supports and
2 endwalls to create an air seal along the insertion highwall between opposing endwalls.
- 1 41. The method of claim 29, wherein the insertion highwall is generally straight between the
2 opposing endwalls.

1 42. A method for extracting mineral deposits in a mineral reserve accessible from a sloping
2 surface, comprising:

3 mining the sloping surface to create a highwall, thereby forming a bench;
4 forming an insertion highwall in a portion of the highwall generally perpendicular to
5 a desired direction of mining the mineral reserve, thereby forming endwalls on
6 opposing ends of the insertion highwall;
7 successively mining the mineral reserve moving from one endwall to the other in a
8 direction of production to extract mineral deposits therefrom, thereby forming at
9 least one successive passage advancing in the direction of mining; and
10 providing roof support for successive passages resulting from the extraction of
11 mineral deposits from the mineral reserve.

1 43. The method of claim 42, wherein the direction of production reverses direction between
2 the endwalls for successive passages.

1 44. The method of claim 42, wherein the bench and highwall extend a first predetermined
2 distance from the insertion highwall to form a first mining stage for mining a first
3 predetermined number of successive passages, and further comprising:

4 mining the mineral reserves using the first mining stage to extract mineral deposits
5 from the first predetermined number of successive passages through the mineral
6 reserve.

1 45. The method of claim 44, further comprising:

2 extending the bench and highwall a second predetermined distance from the first
3 predetermined distance to form a second mining stage for mining a second
4 predetermined number of successive passages; and
5 backfilling the first mining stage to recontour the surface with spoil resulting from
6 mining the sloping surface of the second mining stage.

1 46. The method of claim 42, further comprising:

2 ventilating at least one of the successive passages at one of the endwalls of the

3 successive passage.

1 47. The method of claim 42, further comprising:
2 positioning one canopy at one endwall and another canopy at the other endwall to
3 provide safe access to the successive passage.

1 48. The method of claim 47, further comprising:
2 coupling a reversible ventilation fan to at least one of the canopies.

1 49. The method of claim 48, further comprising:
2 reversing the reversible ventilation fan after creation of each successive passage.

1 50. The method of claim 47, wherein the canopies are mobile.

1 51. The method of claim 50, wherein the step of successively mining the mineral reserve is
2 accomplished by a miner, and further comprising:
3 removing the miner from the successive passage through one of the canopies at one
4 of the endwalls after creation of the successive passage;
5 reversing the orientation of the miner;
6 reversing the orientation of the ventilation; and
7 re-inserting the miner into the mineral reserve adjacent the completed successive
8 passage through the one of the canopies at one of the endwalls.

1 52. The method of claim 51, further comprising:
2 advancing the canopies along the endwalls after creation of the successive passage.

1 53. The method of claim 51, further comprising:
2 backfilling the created successive passages with spoil.

1 54. The method of claim 42, further comprising:
2 allowing gob behind the roof supports to collapse in an area behind the roof supports
3 after the step of providing roof support for successive passages.

- 1 55. The method of claim 42, further comprising:
2 forming a surface in the highwall generally perpendicular to the desired direction of
3 mining the mineral reserve to create an extraction highwall between opposing
4 endwalls of the highwall extending therefrom, the extraction highwall being on a
5 generally opposite side of the mineral reserve from the insertion highwall.
- 1 56. The method of claim 55, further comprising:
2 mining the mineral reserve moving from one endwall to the other in the direction of
3 production to continue extracting mineral deposits therefrom thereby forming an
4 extraction passage;
5 removing mining equipment from the extraction passage; and
6 re-contouring an extraction highwall formed adjacent the extraction passage to
7 proximate an original contour of the sloping surface.
- 1 57. The method of claim 42, further comprising:
2 manually advancing the roof supports in the direction of mining after the creation of
3 each successive passage.
- 1 58. The method of claim 42, wherein the step of mining the sloping surface is accomplished
2 by contour mining.
- 1 59. The method of claim 42, wherein the bench is adapted to support mining equipment.
- 1 60. The method of claim 42, further comprising:
2 creating at least one power substation disposed on the bench to provide power to
3 mining equipment.
- 1 61. The method of claim 60, wherein the at least one power substation is mobile.
- 1 62. The method of claim 61, further comprising:
2 advancing the at least one power substation in the direction of mining relative to the
3 step of successively mining the mineral reserves.

- 1 63. The method of claim 42, wherein the roof supports are inserted via a shield carrier.
- 1 64. The method of claim 42, further comprising:
2 forming a safety bench above the insertion highwall and parallel to the bench.
- 1 65. The method of claim 42, further comprising:
2 conveying the mineral deposits from the mineral reserve to a stockpile.
- 1 66. The method of claim 42, wherein the insertion highwall is generally straight between the
2 opposing endwalls.